Home Explore Search You

- slideshare

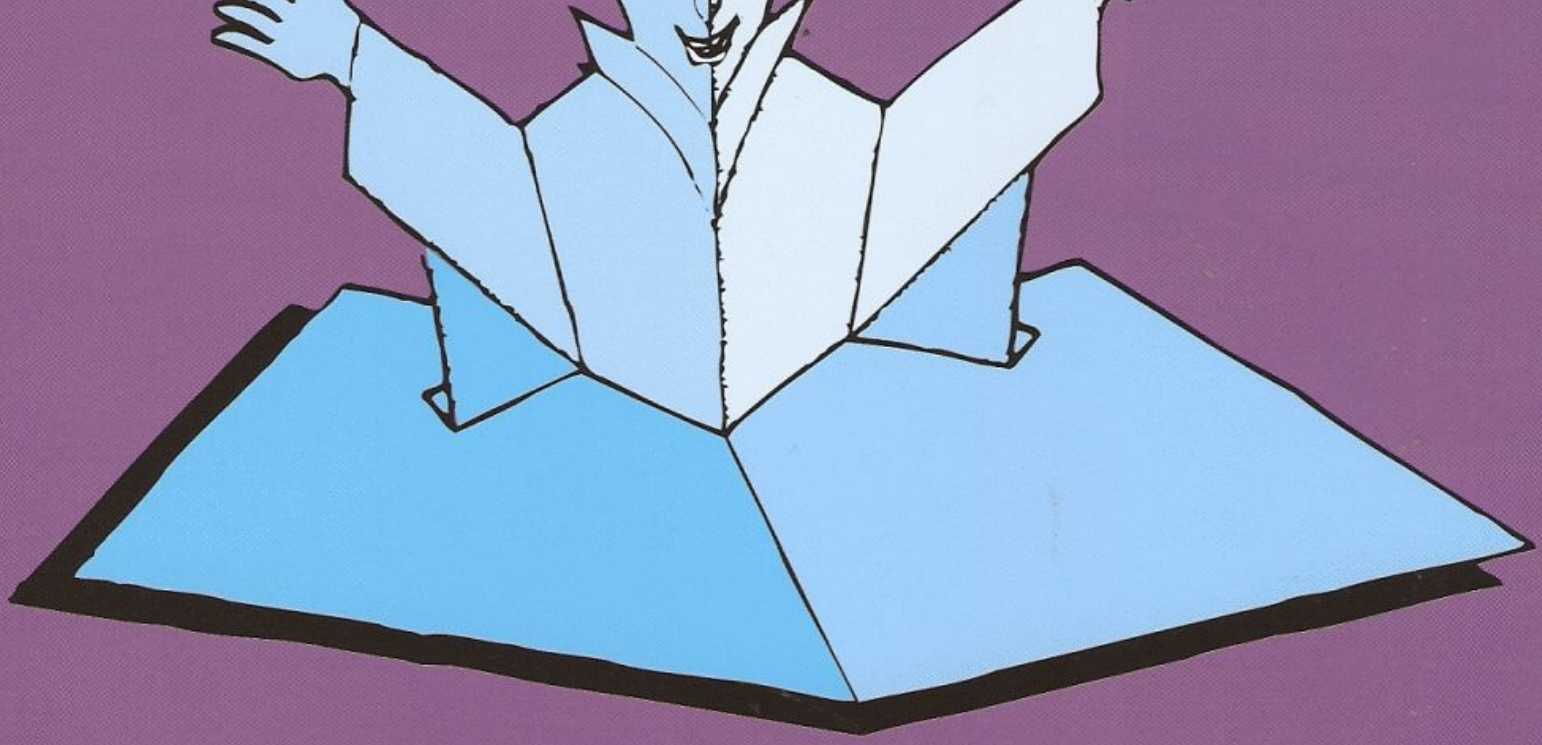
- Upload
- Login
- Signup

- Search

- Home
- Leadership
- Technology
- Education
- Marketing
- Design
- More Topics

Search
Your SlideShare is downloading. ×

Pop-Up! A Manual of Paper Mechanisms



Duncan Birmingham

Pop-Up!

A Manual of Paper Mechanisms

of Paper Mechanisms

Duncan Birmingham

Tarquin Publications

For Jess

If you have enjoyed this book there may well be other Tarquin books which would interest you, including 'Paper Engineering' and 'Up-pops' by Mark Hiner and several other titles by Duncan Birmingham. They are available from Bookshops, Gift shops, Art/craft shops and in case of difficulty, directly from the publishers. See our full range of books on our secure website at **www.tarquinbooks.com**

Alternatively, if you would like our latest printed catalogue please contact us by email: info@tarquinbooks.com, phone: 01727 833866 or write to us at the address below.

© 2006: Duncan Birmingham
I.S.B.N: 1 899618 09 0
Cover: Paul Chilvers
Printing: Fuller-Davies Limited, Ipswich

CE

All rights reserved

Tarquin Publications
99 Hatfield Road
St Albans, Herts
AL1 4JL United Kingdom
www.tarquinbooks.com

This manual offers a working guide to the intriguing mechanisms that leap up from pop-up books or cards. The only realistic way to understand the potential of pop-up technology and to learn how such mechanisms are designed and constructed is to make a wide range of them yourself. Appreciating how the standard mechanisms work and why they sometimes fail is an essential step towards creating original designs of your own.

True pop-ups are based on only three simple ideas. They are known as the 'V-Fold', the 'Parallelogram' and the '45° Fold'. It is the development of these three ideas which creates the wealth and richness which this field of artistic activity has to offer. A particular feature of this collection is how the mechanisms can be grouped into families and how one idea can grow out of another. The manual starts by introducing some simple and elementary designs and then shows how they can be extended, modified and combined to produce sophisticated fold-away paper sculptures, with the potential to illustrate a wide range of stories, topics and notions.

Although the title of this manual is 'Pop-up', it also deals with the slides, pull strips and rotating disks which commonly are found in the imaginative children's books, loosely referred to as 'Pop-up Books'. Since they are made of paper, the general name is 'paper engineering'. Use this manual as a compendium of paper engineering ideas and flick through the pages until you see a design to make. Alternatively, work systematically through it and so acquire a comprehensive understanding of the whole subject.

On pages 4 and 5 there is a list of the mechanisms which shows how they relate to each other. Each mechanism has a reference number and they are grouped under subheadings showing how a particular idea can be developed. Making the first mechanism in each family group will give a good basic understanding of what that particular pop-up technique can offer. The more distant relatives of some of the mechanisms are also listed. These will be useful to advanced paper engineers with a particular design problem to solve or to students seeking a fuller understanding of the possibilities of pop-up and other paper engineering designs.

Before you start to make up designs of your own, read pages 6 to 8. They cover the materials you need, the basic vocabulary and symbols used in the book and also the best order in which to work. Once you have started, it will not be long before something fails to work as you expected or hoped. Page 9 offers suggestions about problem solving and trouble shooting. After pointing out the most common causes of potential difficulties there is advice on how important it is to start by making quick roughs of a new idea.

The creative potential in paper engineering is very great and hopefully this manual will set you off on a rewarding trail which will give many hours of interest and pleasure.

LIST OF MECHANISMS

To explore a particular mechanism and see how it can be adapted, consider the other mechanisms in the same subgroup. Where other mechanisms are mentioned, further ideas and developments are to be found there.

SIMPLE V-FOLDS

MODIFIED V-FOLDS

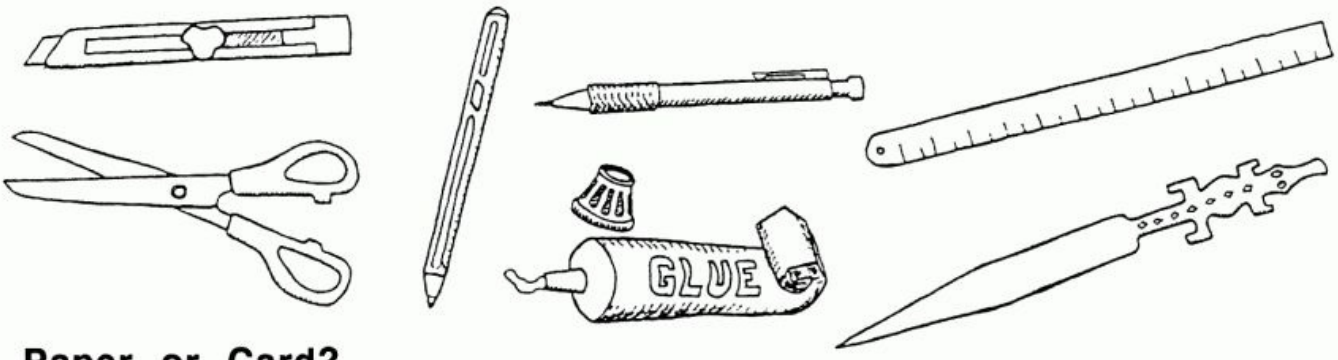
MULTIPLE V-FOLDS

ASYMMETRICAL V-FOLDS

THE PARALLELOGRAM

COMBINING PARALLELOGRAMS AND V-FOLDS

MATERIALS



Paper or Card?
Cartridge paper can be used but it should not be lighter than 135 gsm. The ideal weight is 220 gsm. This is the type of card which is used for postcards.

Scissors or Craft-knife?
A pair of scissors is adequate for cutting out most of the pop-up mechanisms. However for the pull-strip designs a craft-knife is essential. A sharp edge is vital so the type of craft-knife with extending 'snap-off' blades is ideal.

Scoring
Scoring is very important. Using a ball-point pen which has run out of ink creates a strong fold, as the paper's fibres are compressed rather than cut.

Glue
A clear, solvent-based adhesive is best. The new 'Gel' types are probably the most effective as they can be more easily controlled. Water based glues dry

most effective as they can be more easily controlled. Water based glues dry too slowly and may wrinkle the card and the stick-glues, which are sold for paper craft, are not really strong or permanent enough for this type of work.

Pencil & Ruler

A propelling 'clutch' pencil or a hard ordinary pencil is advised.
A ruler is essential for scoring long straight creases. A steel ruler is strongly recomended for cutting against when using a craft-knife.

Cutting-board

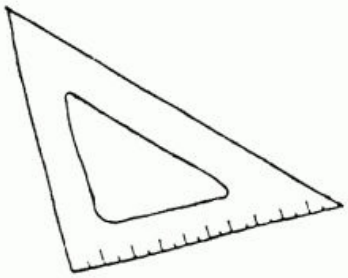
This is really necessary to save your surfaces. Thick cardboard, like the back of a drawing pad, will do, but a commercial mat is best of all.

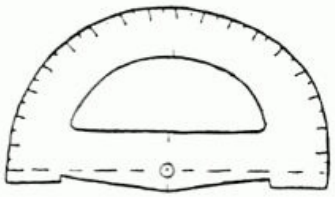
Paper-knife

When sticking pieces into place, a paper knife is very useful for pressing down corners and edges that are hard to reach.

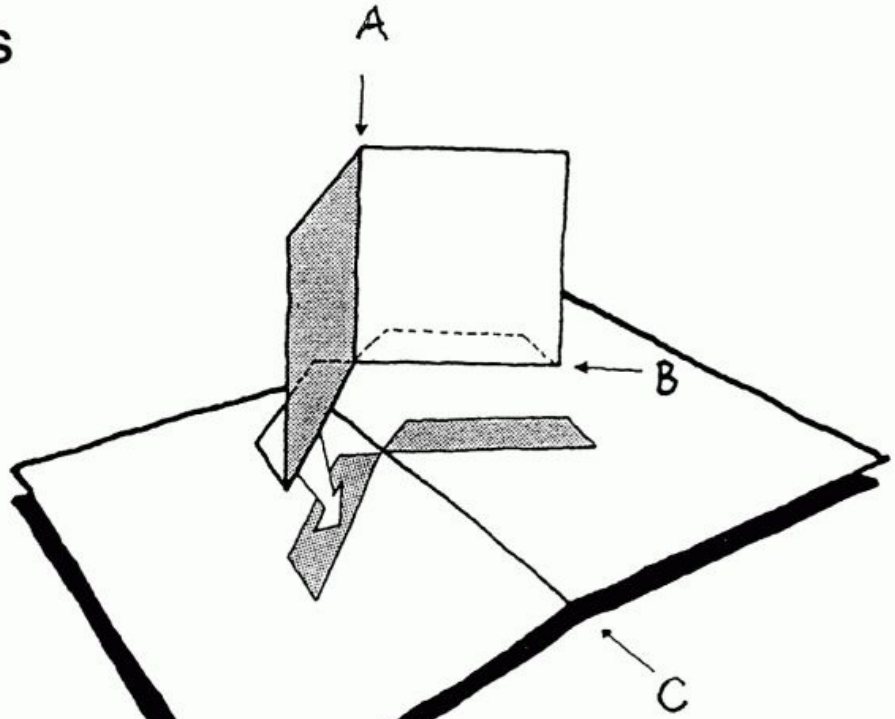
Drawing Instruments

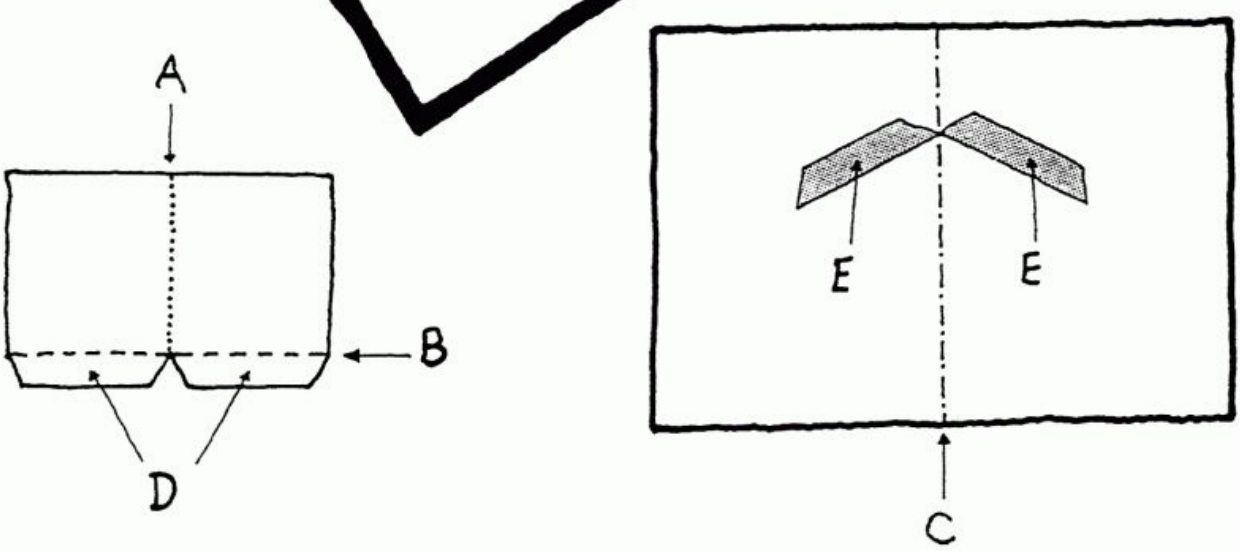
Many lengths and angles have to be measured and drawn very accurately, so a set square, a protractor and a pair of compasses will be needed.





BASICS





Throughout this manual the double-page to which the pop-up is glued is referred to as the **Base**.

There are three kinds of folded line:

1. Valley folds, marked A in the diagrams above.
The crease goes back, away from the viewer.

2. Mountain folds, marked B in the diagrams above.
The crease comes forward, towards the viewer.

3. The Spine, marked C in the diagrams above.
The fold down the centre of the base.

There are also:

1. Gluing-tabs, marked D in the diagrams above.
They are the little flaps that the glue is spread on when sticking a piece onto the base or another pop-up piece. These are usually about 1cm. wide. Any narrower and they tend to pull off.

2. Sticking-strips, marked E in the diagrams above.
They are the areas on the base or other pieces that the gluing-tabs glue to.

WORKING ORDER

1. Measure and draw out the design.
Accuracy when measuring lengths and angles is very important to create mechanisms which move and fold away cleanly.

2. Score all the fold lines.

Scoring makes for a much sharper and more accurate fold. It is easiest to do this before the individual pieces are cut out.

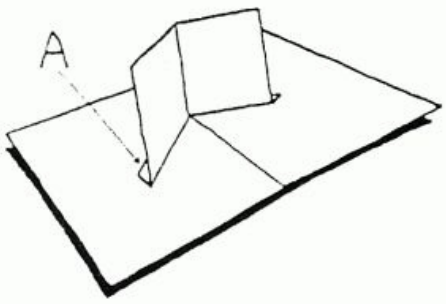
3. Cut out the pop-up pieces.

4. Having scored and cut out the pop-up piece, fold it along each crease and firmly run your finger nail along each fold. Then fold it back on itself and do the same thing again. The more thoroughly creased and easily folding the better. The fold is the hinge of the mechanism. Creasing it well is like oiling a hinge.

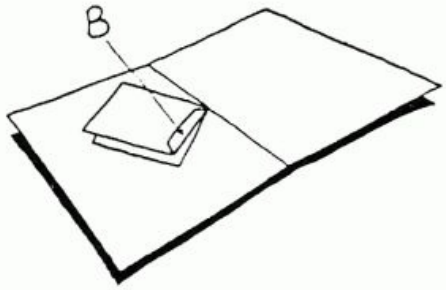
5. Think before you glue. Sometimes flaps become inaccessible as the construction builds up. Where this may be a difficulty the gluing order is explained.

6. When a mechanism uses several pieces, it is best to close the base and press it firmly after each new piece is glued on. If you leave it until the mechanism is complete, it may develop unwanted creases.

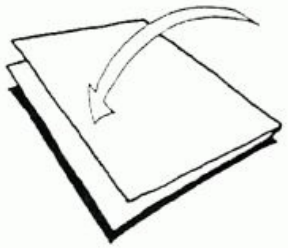
It is normal to glue all the gluing tabs on each pop-up piece to the base before the base is folded shut. However there is another method which is very effective.



1. Put glue on one flap and stick it to the base.



2. Fold the pop-up piece into its closed position, then put glue on the other flap.



3. Close the base. The second flap then finds its natural sticking position.

PROBLEM SOLVING

Occasionally a mechanism doesn't work properly and this is usually due to inaccuracy somewhere. If you do have any difficulties, the most common problems can be tracked down by checking this list.

If the mechanism 'lists' when the page is open, or crumples as the page is closed:
1. Check that the lengths and angles have the measurements which were intended.
2. Check that the lines that should be parallel are parallel.

If the mechanism moves stiffly, or tends to 'hang' in the closed position:
1. It may not have been scored and creased sufficiently.
2. The glue may have oozed and gummed up the works.
3. The card is too thin and is bending where it shouldn't.
4. The card is too thick and isn't bending where it should.

If the pull-strip moves stiffly when pulled:
1. The strip may be being gripped by the page. Check that the slots and sleeves are wide enough and that slits are long enough.
2. If the sleeves are too loose the pull-strip can wobble diagonally. This will cause it to stick.
3. Check for excess glue that's oozed.

DESIGN HINTS

1. When working out a new design always make a rough version first. This is advisable in order to check that pieces fit together and fold away as planned. Having a working model in front of you also makes it far easier to visualise extending and modifying the design.

2. Colouring and decorating the design is easiest while the pieces are still flat and before it is glued into place.

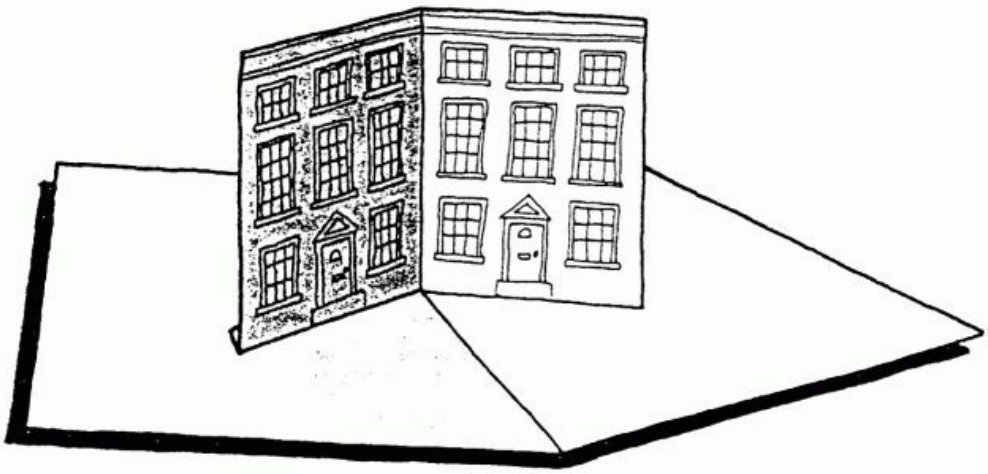
3. When making up new designs, consider the effect of cutting 'windows' in the pop-up planes. Experiment by cutting away parts and to see how little card is actually needed. In this way you can develop exciting pop-up shapes.

4. Remember that the actual mechanism may often only be the 'muscle' which lifts larger images which are stuck on later.

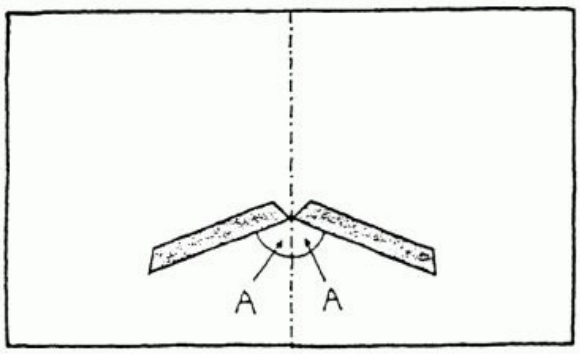
5. Gluing-tabs are normally positioned so that they fold back and are hidden

from view by the pop-up piece. However they may fold forward and become a part of the visual design. For extra strength they can also be inserted through a slit and glued to the underside of the card.

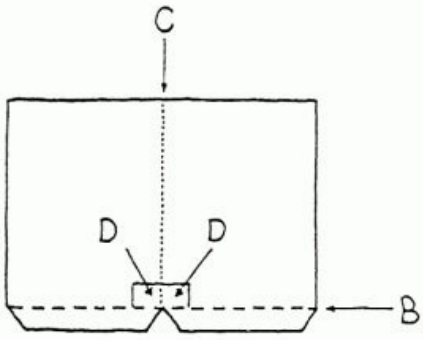
1. THE SIMPLE V-FOLD



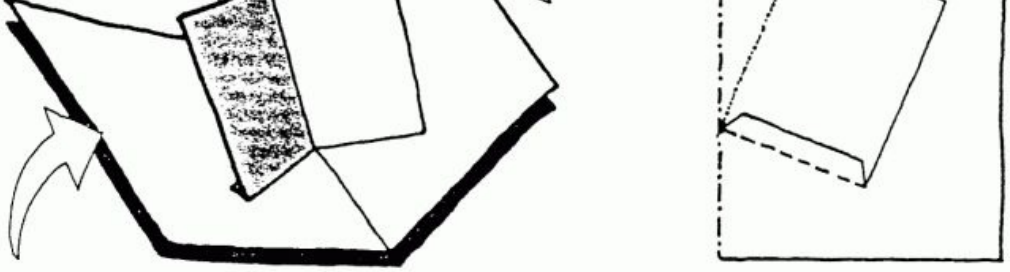
This is one of the most simple pop-up mechanisms, and one of the most useful. In this, its most basic form, it can be enhanced by cutting the pop-up planes into exciting shapes.



On the base:
Angles A must be the same.
They must be less than 90°.
Try making them about 70°.

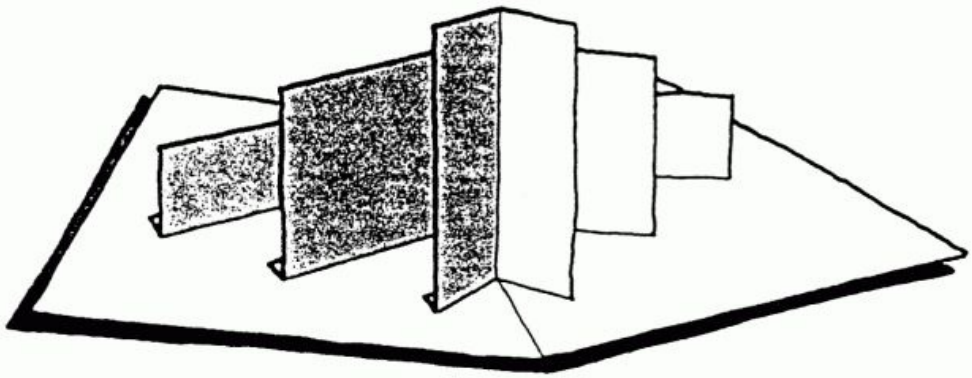


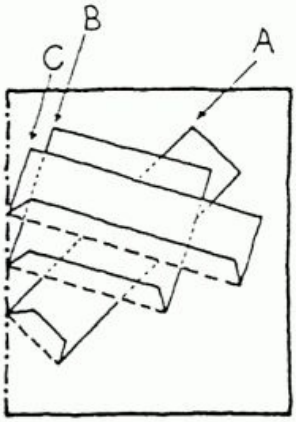
On the pop-up piece:
The scored line B is straight.
The central crease C is vertical
Angles D are both 90°.



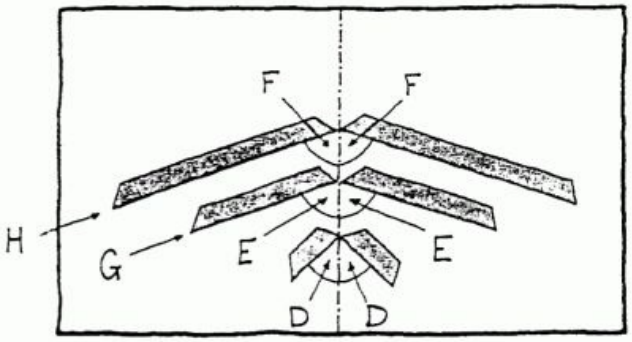
As the base closes the pop-up piece folds down backwards (away from the viewer). Before gluing check where the pop-up piece will fold away to. If it is tall it must be positioned near the front of the base to prevent it jutting out when the base is closed.

2. MULTIPLE SIMPLE POP-UP PIECES

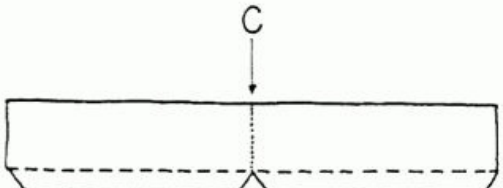




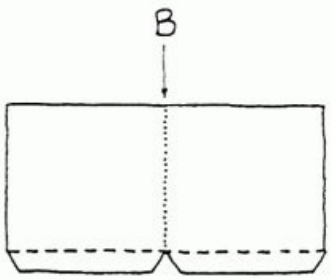
Closed position



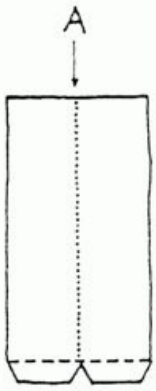
With several pieces popping-up from the base, the danger is that as the base closes and the pieces fold down their central creases (A,B,C) will clash.



To avoid this the central crease of a piece should either fold back less than the one behind it (crease A folds back less than B); or they should fold down parallel to each other (crease B is parallel to C).

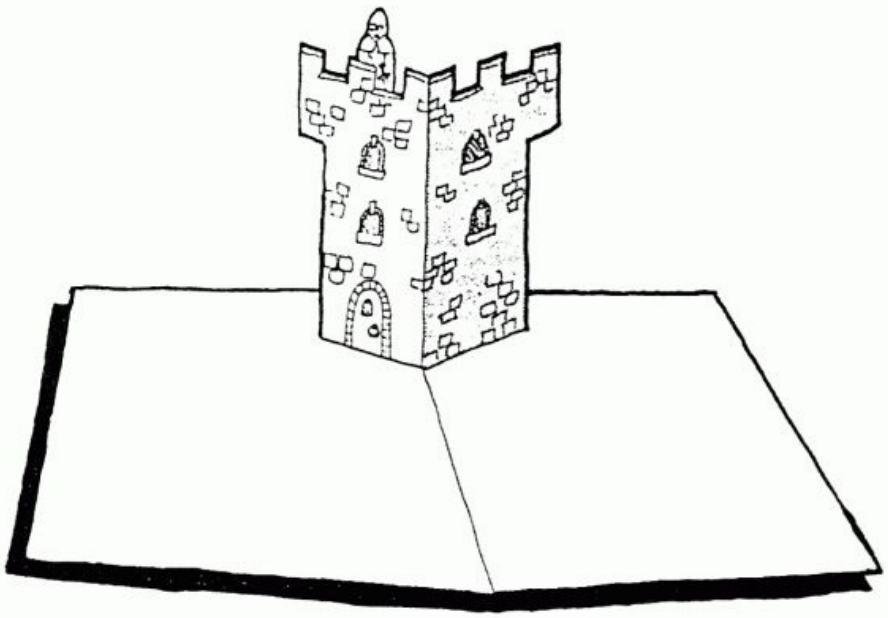


The smaller the angles between the sticking-strips and the spine, the less the piece will lean back as the base closes.

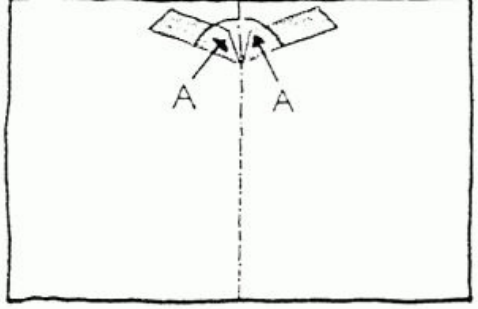


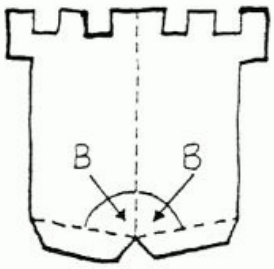
Because angles D are less than angles E, crease A leans back less than crease B. Because angles E and F are the same, sticking-strips G and H are parallel, this makes central creases B lie parallel to C when the base is closed.

3. THE V-FOLD POINTING FORWARDS

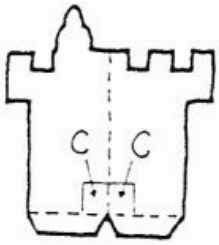


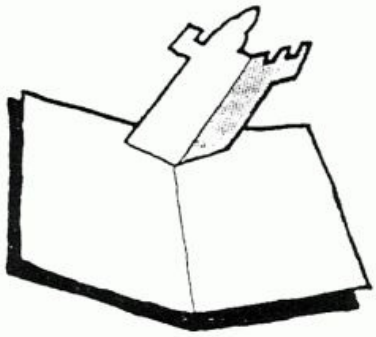
As the base closes the pop-up piece folds down towards the viewer. Therefore tall pop-up pieces need to be positioned near the back, or top, of the base. This is useful as it leaves more foreground clear for illustrations or text.





On the base: Angles A must match each other. Try: A = 70°.
On the pop-up piece: Angles B must match each other. Try: B = 80°.
Angles A must always be smaller than angles B or the base can't open out flat.





When the V-Fold points forward, if angles C are 90° the pop-up piece will tend to sag forwards unless the base is opened out perfectly flat. Making angles C less than 90° cures the sag effect. In Mechanism **1** the pop-up piece folds away backwards so the sag is away from the viewer and actually enhances the visual effect.

Upcoming SlideShare

Loading in...5
×

- Pornographic
- Defamatory
- Illegal/Unlawful
- Spam
- Other Violations

Thanks for flagging this SlideShare!

Oops! An error has occurred.

8 of 98
×

Saving this for later?

Get the SlideShare app to save on your phone or tablet. Read anywhere, anytime - even offline.

Text the download link to your phone

Your phone numb
Your countr
Send Link
Standard text messaging rates apply

Pop up! a manual of paper mechanisms - duncan birmingham (tarquin books) [popup, papercraft, paper engineering, movable books] 2

17,023
views

eme2525 (88 SlideShares)
Follow
2 24 0 3

Published on Dec 04, 2013

Published in: Entertainment & Humor, Business

5 Comments
24 Likes
Statistics
Notes

- Full Name
  Comment goes here.
  12 hours ago Delete Reply Spam Block
  Are you sure you want to Yes No
  Your message goes here

Share your thoughts...

Post

- Florencia Lastreto
  thanks :)
  2 days ago Reply
  Are you sure you want to Yes No
  Your message goes here
- Carolyn Moshtagh at Axxyr Medical Systems Inc.
  LOVE it will use some of this in my scrapbook
  6 months ago Reply
  Are you sure you want to Yes No
  Your message goes here
- Lurdz23
  Thank you so much~ for this.
  9 months ago Reply
  Are you sure you want to Yes No
  Your message goes here
- Marie Ahmad , Admin, Freelancer Design at Marie Design
  likes :)
  11 months ago Reply
  Are you sure you want to Yes No
  Your message goes here
- Phopopart at Phopopart
  thankyou very much!
  11 months ago Reply
  Are you sure you want to Yes No
  Your message goes here
- locky733
  1 day ago
- Paula Ferreira at Comunicação
  1 day ago
- Dante Llanos Vargas
  1 week ago
- Jenniffer Camacho
  2 weeks ago
- Randy Saputra , Owner at Freelance Graphic Designer
  2 weeks ago

Show More

No Downloads

Views

Total Views
17,023
On Slideshare
0
From Embeds
0
Number of Embeds
33

Actions
Shares
29
Downloads
1,215
Comments
5
Likes
24
Embeds 0
No embeds

Report content
Flag as inappropriate
Copyright Complaint
No notes for slide

Recommended
More from User

- Pop up books
gloriaortizh
10,047 views

- Pop up design and paper mechanics
Catalina Leon
18,909 views

- Paper Engineering
bensedman
2,302 views

- La base de los libros PopUp
Alberto Albarrán
3,738 views

- Libro pop up cards gift origamic architecture -libro
Carolyn Moshtagh
1,046 views

- Pop up-simple
cliovirtual
1,199 views

- Pop ups históricos
  Margarita Romero
  969 views

- Pop Ups
  yentl.peeters
  687 views

- Pop up paper engineering - cu boulder & centaurus
  Brian Huang
  993 views

- The pop up book
  Catalina Leon
  1,789 views

- Paper engineering & pop ups for dummies
  Emerson Balderas
  483 views

- Pop Ups
  Diana0909
  5,055 views

- Dialnet semiotica delcomic-4147470
  eme2525
  73 views

- Bocetos y apuntes para maus
  eme2525
  58 views

- Cuaderno de bocetos y guiones de maus
  eme2525
  76 views

- Maus novela grafica
  eme2525
  129 views

- Eisner theory of comics & sequential art (1)
  eme2525
  124 views

- Entintado con plumilla paso a paso
  eme2525
  105 views

- Top10grandesilustradorescontemporneos 130617162127-phpapp01
  eme2525
  28 views

- Perspectiva
  eme2525
  46 views

- Entintado con plumilla
  eme2525
  170 views

- Rostro femenino con colores
  eme2525
  107 views

- Lapices de colores teoria del color
  eme2525
  110 views

- Tecnicas de lapiz de color
  eme2525
  754 views

- ENGLISH
  - English

- Français
- Español
- Português (Brasil)
- Deutsch

- English
- Espanol
- Portugues
- Français
- Deutsche

- About
- Careers
- Dev & API
- Press
- Blog
- Terms
- Privacy
- Copyright
- Support

LinkedIn Corporation © 2015

Share this documentEmbed this documentLike this documentYou have liked this documentSave this document